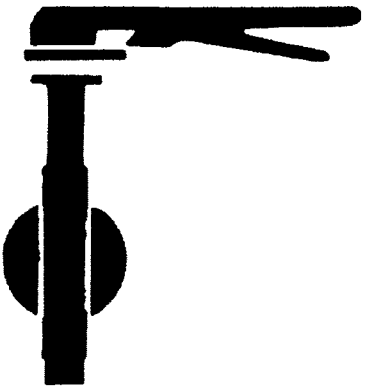
Installation, Operation and Maintenance Manual for Wafer-type BUTTERFLY VALVES



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1.0 STORAGE

On receipt, check that the valves and accessories are intact. Ensure that the valve is in a 'crack-open' position so that the elastomer seat is not under compression, and at the same time the disc does not protrude outside valve body.

End protectors (stickers) on either side of the valve should be kept in tact and be removed only at the time of installation. Direct exposure to sunlight can deteriorate the elastomer.

The valves should be stored in a covered area. If covered area is not available, any water proof covering material should be spread over the valves and the valves should be kept on a wooden pallet at least 6" above the ground level.

Do not apply tar, paint, grease or any other material inside the valve or on the shaft as this would impair the performance of the valve.

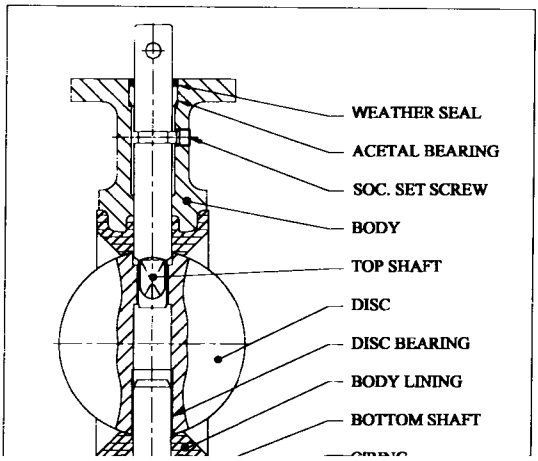
While transporting the valve from storage area to installation site, it should not be dragged on the ground.

2.0 CONSTRUCTION

AIL Wafer type butterfly valves are of compact design and light weight.

The rubber lined butterfly valves provide tight shut-off. The disc seats on to an integrally moulded elastomer in the body. The disc is operated by a shaft driven internally.

The typical valve construction is shown below.



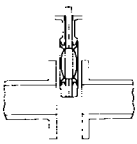
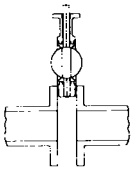
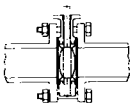
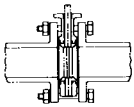
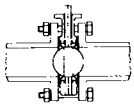
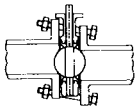
a. Slimseal - used for general purpose.
b. Chemseal - used in chemical and corrosive services
c. Cleanseal - for food & hygienic services
d. Aquaseal - for air conditioning & refrigeration industry

3.0 INSTALLATION

a. Handle the valve with appropriate lifting equipment. Use lifting lugs/eye bolts only for handling. Prop up the valve temporarily if necessary. Keep the valve in nearly closed position while installing.
b. Do not use rope or chain through valve port. Use the bolt relief holes at the top of the body for passing the rope or chain.
c. Carefully check the cleanliness of the companion flange faces and clean if necessary.
d. Centre the valve such that the shaft is in a centre position. Do not use valve as jack to pull the pipe into alignment.
e. Fit the flange bolting on both sides and tighten. No gasket is required separately.
f. Ensure the valve interiors and adjacent piping are cleaned prior to tightening the joints.
g. Tighten the bolts, working diagonally to the required torque, using a torque wrench.
h. Ensure that the pipline stresses are not transferred on to the valve as this can result in leakage across the seat or difficulty in operation.
i. In new pipelines when weld neck companion flanges are used, centre each flange bore to the valve bore and run the bolts through. Tack weld the pipes to the flanges and remove the boltings to take out the valve; then finish weld the flanges to pipe so that the elastomer seat is not damaged by the welding.
j. As no separate gasket is required between the flanges, flat face flanges are recommended. In case of valves with EPDM, Hypalon, Silicone or Aqua nitrile, it must be ensured that the flange faces are totally free from grease/oil which will swell the elastomers.

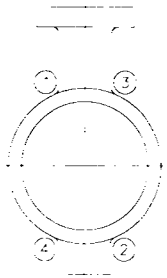
3.1 Do's & Dont's

INSTALLATION INSTRUCTIONS

✔ Correct Installation		✘ Incorrect Installation	
	(a) Mating pipe flanges should be kept well apart to allow free access for the valve. The disk should be slightly off its seat but not protruding to damage the disk.		(a) Mating flanges are too close to allow access for the valve and the disk in the wrong position.
	(b) Disk in the same position (slightly open) when flange bolts are inserted will ensure that no distortion of the seat takes place on final tightening.		(b) Disk again is in the wrong position (closed) and this will firstly distort the seat on installation and secondly cause excessive torque in initial operation.
	(c) Before evenly tightening the flange bolts see that the valve is centralised and then if possible, fully open with care to ensure the disk does not foul the internal bore of the pipe.		(c) If the valve is not centralised between the adjoining pipe flanges this will result in excessive torque, damage to the disk and eventual leakage

3.2 Sequence of Flange Tightening

The sequence to be followed for bolts tightening while installation of valve is shown below.



Insert 4 bolts near to neck area and tighten the bolts as per the sequence given in the figure evenly and not fully tightened.

Check the valve is being concentric to the pipeline and ensure smooth operation of valve.

If further bolts are to be tightened, follow the similar sequence i.e. tighten the bolts diagonally and not fully tightened.

Now tighten all the bolts diagonally till the clamping faces of flange just touch the body metal end faces. Over tightening is not necessary and to be avoided.

These valves are suitable for installation between pipe flanges listed below:

1. BS 4504 - PN10/DIN ND10

2. BS 4504 - PN16/DIN ND16

3. ANSI B16.1 - Class 125/
   ANSI B16.5 - Class 150

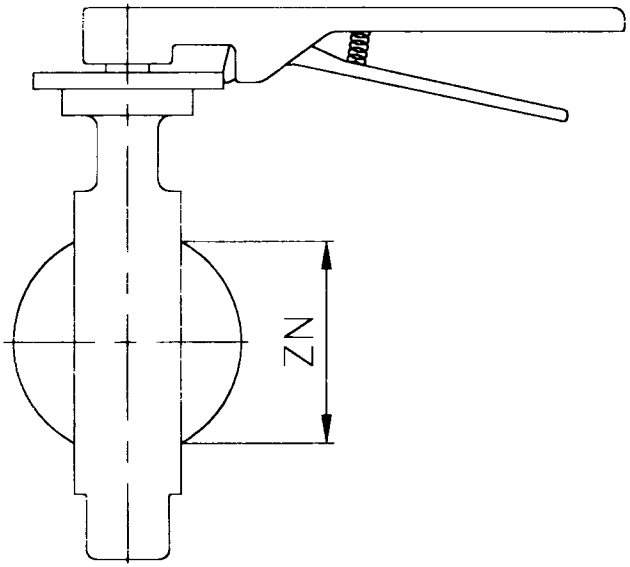
4. BS10 - Table D

5. BS10 - Table E

6. IS 6418 Tables 6 to 9

7. IS 6392 Tables 10 to 20

3.3 Lined Pipes and Heavy Walled pipes should have a Minimum inside diameter well clear of Dimension "ZN" (Refer Figure shown Below) in Disc full open position.



Dimensions & sizes in mm

Valve size	50	65	80	100	125	150	200	250	300	350	400	450	500	600
"ZN" - Dimn. of protruding disc	27	47	63	83	107	136	185	234	280	325	376	424	476	573

When installing the valve between existing pipe flanges, the flanges are required to be spread sufficiently while placing the valve between them to prevent any damage to the sealing end face which acts as the gasket. Pipe line is expected to provide for this flexibility.

4.0 VALVE MOUNTING

AIL Butterfly valves are bi-directional and can be mounted in vertical or horizontal or angular pipelines with shaft in any position.

Slurry Service

The valve is to be mounted on horizontal pipeline with shaft in the horizontal position with lower disc edge opening in the down stream side for best results.

5.0 START-UP

After installation, the pipeline should be cleaned by compressed air or by flushing with water, keeping the valve fully open. The use of temporary filters on the upstream side of the disc is recommended to avoid any damage caused by the transportation of abrasive particles. Ensure that the pipeline stresses are not transferred to the valve as this can distort the seating and result in leakage around the seat or higher torque.

6.0 HYDRAULIC TEST OF THE INSTALLATION

AIL Butterfly valves are individually pressure tested in our factory. If a hydraulic test of the piping installation is to be undertaken, make sure that the valve disc is in the open position and check that the valve material installed is compatible with the test medium. Test pressure be limited to the maximum rated pressure.

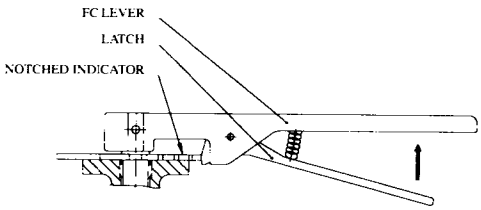
7.0 OPERATION

7.1 Manually operated valves

(i) AIL Butterfly valves upto 12" can be operated by wrench and sizes above 12" are supplied with gear unit. Gear Unit can be fitted for any size on specific request at the time of ordering.

(ii) VALVES WITH FC LEVER AND LATCH ARRANGEMENT:

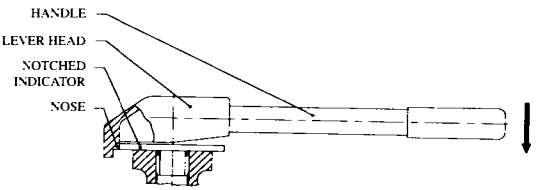
The general construction details of FC lever and latch fitted on to valve is shown below.



Press the latch upward to release the latch from notched indicator. At pressed condition operate the valve. If the pressing is not done fully while operation, latch will get damaged by the notched indicator.

(iii) VALVES WITH FC LEVER HEAD ARRANGEMENT:

The general construction details of FC lever fitted on to valve is shown below.



Press the handle down to release the lever head from notched indicator. At pressed condition operate the valve. If the pressing is not done fully while operation, lever head nose will get damaged by the notched indicator.

(iv) GEARED VALVES : All gear boxes have an indicating pointer on the gear box which shows the angular movement of the disc as well as the open/closed positions. They also have a positive stop in both the open and closed positions.

When closing the valve, the handwheel should be turned only up to that position where the indicating pointer matches with the letters "CLOSE" on the gear box case. This by itself will ensure proper sealing. There is no need to "slam" the hand

wheel till it jams this practice is neither necessary nor recommended.

Similar is the case when opening the valve.

7.2 Electrically operated valves

- Electrical actuators are fitted to the gear unit or directly mounted.
- For operational details consult the manufacturer's instruction manual and the appropriate wiring diagram.
- Ensure that electrical connections are given as indicated in the wiring diagram for the specific actuator.
- Before making a test run move the disc to an intermediary position by means of the hand wheel.
- Start the motor and see if the working direction is correct.

7.3 LIMIT SWITCH SETTING

The actuator limit switch is set in the factory. However, for valves with extension spindle, actuator is approximately preset and should be reset at site. The presetting can also be modified if required once the valve has been put into service.

Do not disturb the mechanical stops in the quarter turn gear unit which are factory set.

8.0 MAINTENANCE

In normal use, these valves are maintenance free and require no attention. They are literally 'fit & forget' valves.

8.1 Seat Leak

If there is a leak across the seat, check disc surface. If the disc is damaged, it can be replaced as detailed below :

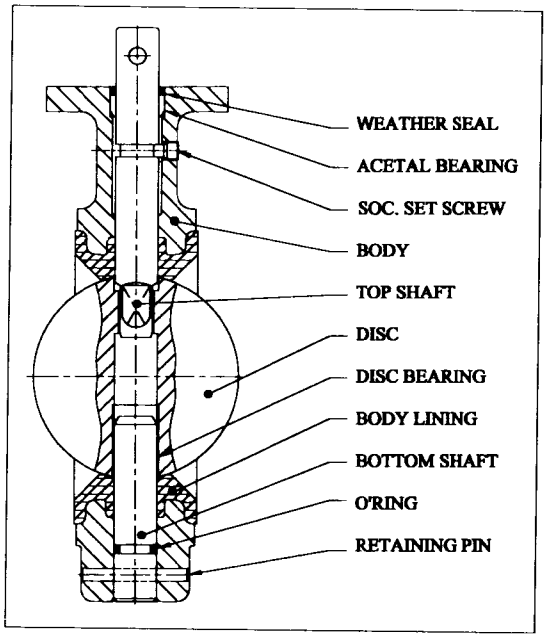
8.2 Dismantling and Re-Assembly

Generally there is no need to dismantle our valves. However, if it is desired, the valve can be dismantled and reassembled.

To dismantle the valve, proceed as follows.

8.2.1 (a) 50-300 mm SLIMSEAL, CHEMSEAL & CLEANSEAL BUTTERFLY VALVES

The construction of this group is shown in the following diagram:



Dismantling

1. Remove the gear unit or actuator if fitted. The wrench may be left in position on wrench operated valves.
2. Remove the socket set screw and pull out top shaft.
3. Remove the bottom shaft-retaining pin.
4. Insert a long drift through the top shaft hole and drift out the bottom shaft.
5. Pull out the disc.

Re-Assembly

1. Clean body, shafts, disc etc.

   NB: After cleaning and prior to assembly, a light application of silicone grease to all surfaces of all mating components is recommended (No other grease to be used, which may be harmful to certain kinds of elastomers).

2. 'O' ring on bottom shaft should be replaced with new.

3. For 50mm to 200mm stainless steel disc fitted valves, fix new PTFE bearing into disc if the bearing has suffered any damage.

4. Push disc into bore of body in fully open position and ensure position of square hole in disc towards top platform end of body.

5. Fit top & bottom shaft, and ensure top shaft cross hole position is perpendicualr to the disc position.

6. Align corresponding holes in body and bottom shaft & fit new bottom shaft-retaining pin.

7. Align groove in top shaft with corresponding hole in body and tighten new socket set screw till it touches the shaft & unscrew 1/2 turn to ensure it does not 'jam' the shaft.

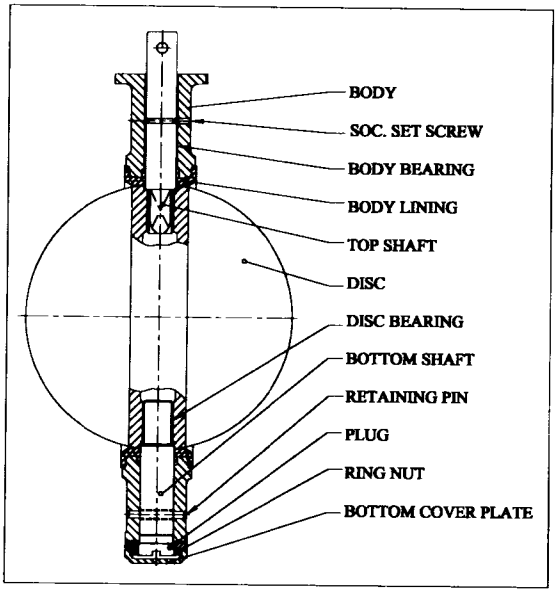
8. Fix weather seal on top of valve.

9. Fit operating mechanism and ensure clockwise rotation for close operation.

10. Check the disc/wrench orientation is correct. Lever indicates the position of disc in the valve. "Lever along the pipeline" will mean, "disc open", and "across the pipeline" will mean, "disc closed". Check this feature while making 'disc to shaft' connection. If the disc orientation with lever is wrong, the disc can be rotated through 90° to correct the fault, after dismantling.

(b) 350-600mm SLIMSEAL Butterfly Valves

The construciton of this group is shown in the following diagram:



Dismantling

1. Remove the gear unit or actuator if fitted.
2. Remove the socket set screw and pull out top shaft
3. Remove the screws and remove bottom cover plate, lock plate, plug & ring nut.
4. Remove the bottom shaft-retaining Pin.
5. Insert a long drift through the top shaft hole and drift out the bottom shaft.
6. Pull out the disc.

Re-Assembly

1. Clean body, shafts, disc etc.

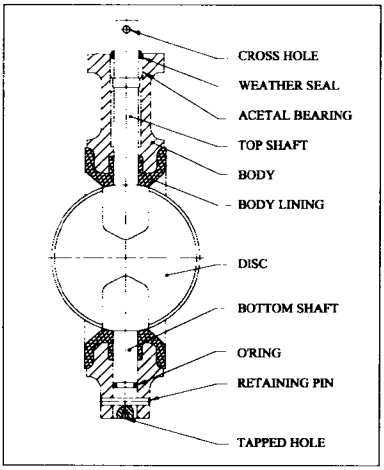
   NB: After cleaning and prior to assembly, a light application of silicone grease to all surfaces of all mating components

is recommended (No other grease to be used, which may be harmful to certain kinds of elastomers).

2. Push disc into bore of body in fully open position and ensure position of square hole in disc towards top platform end of body.
3. Fit top & bottom shaft, and ensure top shaft cross hole position is perpendicular to the disc position.
4. Align corresponding holes in body and bottom shaft & fit new retaining pin.
5. Align groove in top shaft with corresponding hole in body and tighten new socket set screw till it touches the shaft & unscrew 1/2 turn.
6. Fix lock plate with gasket or 'o' ring to bottom platform of body.
7. Lock the bottom shaft with plug and ring nut adjusting suitably to avoid seat leak.
8. Fix the bottom cover plate with 'o' ring or gasket to the platform of body.
9. Fit operating mechanism and ensure clockwise rotation for close operation.

8.2.3 (c) 50-300mm Aquaseal Butterfly Valves

The construction of this model is shown in the following diagram:

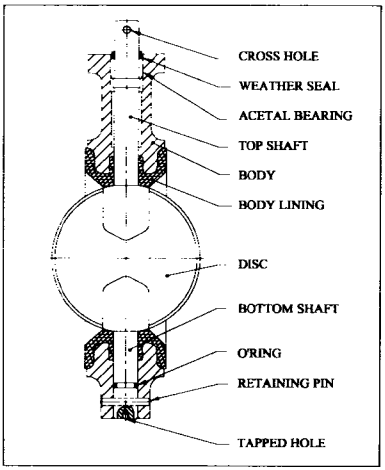


is recommended (No other grease to be used, which may be harmful to certain kinds of elastomers).

2. Push disc into bore of body in fully open position and ensure position of square hole in disc towards top platform end of body.
3. Fit top & bottom shaft, and ensure top shaft cross hole position is perpendicular to the disc position.
4. Align corresponding holes in body and bottom shaft & fit new retaining pin.
5. Align groove in top shaft with corresponding hole in body and tighten new socket set screw till it touches the shaft & unscrew 1/2 turn.
6. Fix lock plate with gasket or 'o' ring to bottom platform of body.
7. Lock the bottom shaft with plug and ring nut adjusting suitably to avoid seat leak.
8. Fix the bottom cover plate with 'o' ring or gasket to the platform of body.
9. Fit operating mechanism and ensure clockwise rotation for close operation.

8.2.3 (c) 50-300mm Aquaseal Butterfly Valves

The construction of this model is shown in the following diagram:



Dismantling

1. Remove operating mechanism complete
2. Remove bottom shaft-retaining pin & pull bottom shaft by using tapped hole at the bottom.
3. Pull out top shaft & acetal bearing by using cross hole.
4. After removing two shafts the disc can be pushed out from the body.

Re-Assembly

1. Clean body, shafts, disc etc.

   NB: After cleaning and prior to assembly, a light application of silicone grease to all surfaces of all mating components is recommended (No other grease to be used, which may be harmful to certain kinds of elastomers).

2. 'O' ring on bottom shaft & acetal bearing for top shaft should be replaced with new.
3. Push disc into bore of body in fully open position and ensure position of square hole in disc towards top platform end of body.
4. Push the bottom shaft into body and disc shaft holes.
5. Align corresponding holes in body and bottom shaft & fit new retaining pin.
6. Push the top shaft through body shaft hole to locate in disc.
7. Fix new acetal bearing at the top of body till it touches the top shaft shoulder.
8. Fix weather seal on the top of valve.
9. Fix operating mechanism and ensure clockwise rotation for close operation.
10. Check the disc / wrench orientation is correct. Lever indicates the position of disc in the valve. "Lever along the pipeline" will mean, "disc open", and "across the pipeline" will mean, "disc closed". Check this feature while making

'disc to shaft' connection. If the disc orientation with lever is wrong, the disc can be rotated through 90^0 to correct the fault.

AFTER ASSEMBLING ANY SLIMSEAL, CHEMSEAL, CLEANSEAL OR AQUASEAL VALVE, THE FOLLOWING PRECAUTIONS TO BE FOLLOWED TO ENSURE TROUBLE FREE PERFORMANCE.

GENERAL PRECAUTIONS

1. If any further cleaning is necessary this should be done with diluted detergent followed by water and should not be with a hydrocarbon or similar solvent.
2. Check complete operation of valve and if necessary adjust the 'open' and 'shut' positions of gear boxes and actuators to ensure correct operation.
3. Pressure test the valve before putting it back to work. If in doubt about the test procedure, please refer BS : 5155 latest amendment.
4. Do not expose elastomer seats to sunlight or ozone for extended periods (In case of black nitrile liner, its contact with ozone should be totally avoided).
5. Foreign material in the butterfly valve can damage elastomer seat when operated. Ensure valve interiors and adjacent piping are thoroughly cleaned prior to installation.
6. Ensure the valves are not subjected to pressures above rated pressures of the valves (Black nitrile - 16 bar; White nitrile - 14 bar; Hypalon/Viton - 12 bar EPDM, Silicone - 6 bar; Aquaseal - 10 bar).
7. Ensure end faces are suitably protected by end protectors to prevent damage to disc and body lining while in storage.
8. If pipelines are being purged prior to commissioning, this should be done with the valves in the fully open position. Care to be taken to ensure that the purging pressure does not exceed the test pressure of the valve.